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ABSTRACT

This handbook was written to enable elementary school educators to conduct formative evaluations of their computer integrated instruction (CII) programs in minimum time. CII is defined as the use of computer software, such as word processing, database, and graphics programs, to help students solve problems or work more productively. The first chapter provides an overview of computer education and program evaluation, and the second covers planning for evaluation. The third chapter explains how to collect the data to describe the existing CII program. Interpreting the data and answering evaluation questions are covered in the fourth chapter. Finally, the presentation of the evaluation report is discussed in chapter 5. Appendices include copies of questionnaires for seven facets of the integration program, i.e., planning, program description, goals, staff, plans, activity implementation and goal attainment, and strengths and weaknesses. Also appended are a summary of the research procedures and results upon which this handbook is based. The handbook is intended for use by both experienced and inexperienced evaluators to improve an existing CII program and no formal knowledge of program evaluation is required. (DB)

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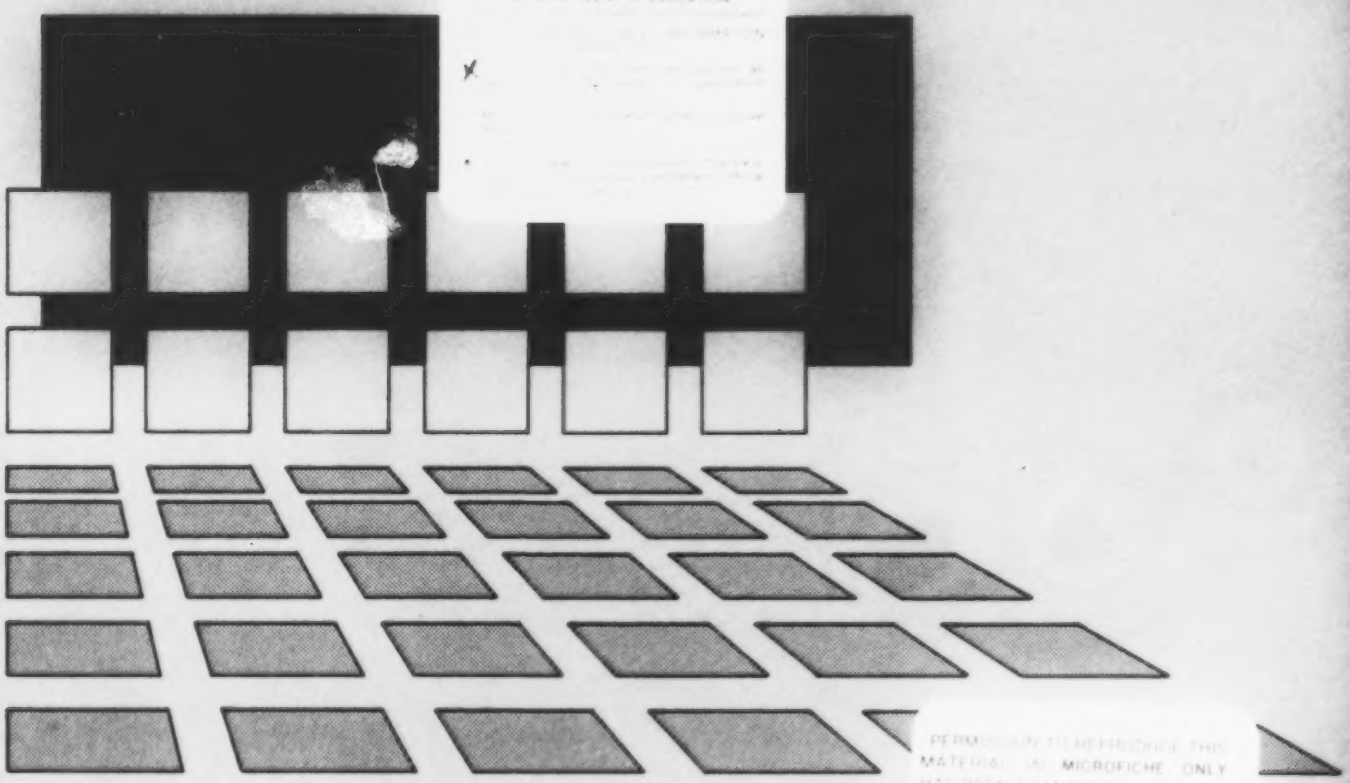

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Evaluating Computer Integration in the Elementary School:
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Richard Mowe

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Preface

As the availability of computers in schools has increased rapidly in recent years, computer education programs have become commonplace. The programs, both planned and unplanned, could be better if systematic means existed for their evaluation. Often, when such program evaluation is being contemplated, the people planning the evaluation find they have little time and little knowledge of program evaluation or computer education.

I have written this handbook to enable educators at the elementary school building level to conduct formative evaluations of their computer integrated instruction (CII) programs in a minimum of time. No formal knowledge of program evaluation is required. Principals, computer coordinators, and teachers who use CII will find this book helpful and easy to use.

Formative evaluation is the assessment of a program for the purpose of improving the program. CII is the use of computer software, such as word processing, database, and graphics programs, to help students solve problems or work more productively. This book also facilitates evaluating the use of keyboarding, problem solving, and simulation software, which are closely related to CII.

This book is divided into five main chapters. The first chapter provides an overview of computer education and program evaluation. The second chapter covers the planning for evaluation. The third chapter explains how to collect the data to describe the existing CII program. The fourth chapter explains how to interpret the data and to answer evaluation questions. The fifth chapter assists in the presentation of the evaluation report. The appendix contains the evaluation questionnaires and a summary of the research procedures and results upon which this handbook is based.

The handbook is written for a variety of audiences. If your purpose for reading it is to gain background in program evaluation of CII but not do an evaluation, you may want to read the handbook quickly and ignore the questionnaires. If you are a new evaluator, you may read the handbook sequentially to cover background topics. Then as you use the questionnaires, you can refer back to relevant pages for more information. If you are a veteran evaluator, you can use the questionnaires directly, designing your own methods for collecting, analyzing, and reporting the information, and use the remainder of the handbook for occasional reference.

I encourage you to work with this handbook as part of a group of educators for several reasons. First, you can help each other on parts that seem confusing. Second, spreading the workload makes the job easier for everybody. Finally, the more people who work on the evaluation, the greater chance that the evaluation recommendations will be carried out.

Richard Mowe
May 1990

CHAPTER 1
Overview

Using the Handbook

This handbook is written to help you perform a formative evaluation of your computer integrated instruction (CII) program at the elementary school level. If you are new to evaluation, you will receive maximum benefit from the handbook by reading the whole book before planning the evaluation and completing the questionnaires. As you complete the questionnaires, use the handbook as a reference as necessary.

If you are an experienced evaluator and are using the handbook only for the questionnaires, turn directly to the appendixes where the questionnaires are located. As you complete your evaluation design, you can use parts of the handbook for a reference to see if you missed anything.

To understand the handbook, it is important that you understand the terms "computer integrated instruction" and "formative evaluation."

Computer Integrated Instruction

Computer integrated instruction is the instructional use of the computer as a tool to work more productively. Increased productivity may come in the form of increased working speed or as an aid to problem solving.

Word processing is an example of computer tool use. With proper training, a person can type, edit, and revise a paper more quickly using a word processor than by writing it out by hand or using a typewriter.

Another tool use is represented by the database. Consider a database of names and facts about the nation's leaders. The database allows the facts to be quickly rearranged to solve problems in history. For instance, arranging the information about leaders by political party shows when various parties were popular. Other CII uses are graphics and spreadsheets, which are sometimes closely tied to databases.

Computer assisted instruction (CAI) is a second instructional use of the computer. CAI is the use of the computer in which the computer acts as a teacher to help a student learn or practice knowledge and skills. The handbook covers CAI software related to CII. Keyboarding software is covered because the productive use of word processing is enhanced by keyboarding ability. Problem solving and simulation software are included because of their contribution to teaching problem solving. Other areas of CAI, while important computer uses, are not covered in the handbook.

The third instructional computer use is computer science, which includes programming and the theoretical foundations of computers. The handbook does not discuss computer science because the focus of computer science is the computer itself rather than the issues of work productivity and problem solving generally addressed in the school curriculum.

CHAPTER 2
Planning the Evaluation

To plan the evaluation, first choose the questionnaires, which will make up the heart of the evaluation. Next, determine who will complete the questionnaires. Will one person complete the questionnaires on behalf of the rest of the staff, or will a number of people participate? Finally, make up a schedule for planning, data collection, interpretation, and reporting. The Planning Questionnaire, located on page 33, can assist you in these tasks.

Choice of Questionnaires

The type of evaluation you choose depends on the stage of development of your CII program and your information needs. Typically, a CII program evolves through three stages of development.

Exploratory Stage

The first stage is an exploratory one. For example, a school may use various computer strategies but may not have settled on the best ways to use computers. The school may lack CII goals, or the goals may be too vague to provide specific guidance. The school may have a computer plan that is outdated and in need of revision, or it may have no plan at all.

In the exploratory stage, a school needs a building computer plan. The handbook can assist in providing the data that would be needed to write the plan. The handbook will first help in writing a description of the current program. Whatever your school is currently doing *is* a plan, even though it may not be in a written form. Regardless of its status, it is a program that can be built upon. The handbook can assist you in writing program goals and in assessing staff CII knowledge and skills. Finally, the handbook can help you examine the general strengths and weaknesses of the present program.

Planning Stage

When a school begins to write its CII goals and plans, it enters the planning stage. This is an in-between stage because the school has passed the exploratory stage and yet has not had time to actually implement the plan. The concerns in the planning stage are general concerns. For instance, what knowledge does the staff have or what are the general strengths and weaknesses of the program?

Implementation Stage

The third stage involves implementation. At this point, a plan has been written, teachers have been trained, and computers and other materials have been purchased. The concern is that the plan should be implemented as planned. The handbook assists the school in writing a description of its current program and comparing that description with the planned program.

Figure 2-1 suggests questionnaires to choose for different stages of program development. The top row of boxes describes the stages of development, and the bottom row lists the questionnaires for each stage. For instance, if you are in the planning stage, use the "Program Description," "Staff," and "Strengths and Weaknesses" questionnaires.

Exploratory	**Planning**	**Implementing**
No written goals specific enough to guide the program, or goals need to be rewritten No written plan for achieving goals, or the plan needs to be rewritten Few staff involved	Goals written Plan written	Goals and plan written Teachers trained Adequate computers and software purchased
Use Questionnaires	**Use Questionnaires**	**Use Questionnaires**
Program Description, page 37 Goals, page 45 Staff, page 49 Plan, Page 55 Strengths,Weaknesses, page 63	Program Description, page 37 Staff, page 49 Strengths,Weaknesses, page 63	Program Description, page 37 Implementation, Attainment, page 59 Strengths,Weaknesses, page 63

Figure 2-1. Selecting Questionnaires for Different Stages of Development

Some modifications to the above suggestions may have to be made. Perhaps your program is in transition between two of the stages or perhaps a recommended questionnaire may yield duplicate information. If so, examine the questionnaires to find the ones most appropriate for your evaluation.

Who Completes the Questionnaires?

Several possibilities exist for who completes the questionnaires. If the program is small and one person is familiar with the program, he or she can complete all the questionnaires on behalf of the school. The estimated time to complete the evaluation is ten hours, but this will vary depending on the number of questionnaires required.

If several people are involved in the CII program, they could divide the questionnaires among themselves so that each person fills in one questionnaire, thus dividing the work. In this case, different people would answer the questionnaires on behalf of the school. The total estimated time for completion is 10-12 hours, but the time will be less for each person since the work will be divided among several people.

In a school where many teachers are participating in the CII program, one person or a group of people may not have enough information to complete the questionnaires. In this case, some of the questionnaires could be completed by each teacher. Then one evaluator or a group of evaluators can compile the individual questionnaires into a master list. Compilation forms for the Staff Questionnaire and Strengths and Weaknesses Questionnaire are found in the appendix on pages 49 and 63. If may teachers are involved, the evaluation will take longer but will produce more information.

The Schedule

A schedule for data collection and the evaluation in general can help keep the evaluation on track. Three weeks is the suggested amount of time to complete the evaluation. (Remember that it will take about a dozen person-hours of time during these three weeks.) Of course, your information needs and other time commitments will influence the amount of time needed. Figure 2-2 shows a completed sample schedule. Each of the ten entries in the figure represents about one hour of work.

Week	Monday	Tuesday	Wednesday	Thursday	Friday
P	P	AQ1		AQ2	
AQ3		AQ4	I	I	
R		R			

Key P=Planning
I=Interpreting Data
R=Reporting Results

AQ#=Administer Questionnaire # (#=1-6)
1=Program Description Questionnaire
2=Goal Questionnaire
3=Staff Questionnaire
4=Plan Questionnaire
5=Implementation, Attainment Questionnaire
6=Strengths and Weaknesses Questionnaire

Figure 2-2. Sample Evaluation Schedule

The schedule shows that during Week 1 the evaluation was planned and Questionnaires 1 and 2 were administered. During Week 2, Questionnaires 3 and 4 were administered, and data interpretation took place on Thursday and Friday. Finally, the report was written during Week 3.

CHAPTER 3
Collecting The Information

Introduction

The following sections explain how to gather evaluation information that describes and answers a number of questions about your current CII program. Each section listed below is supported by a questionnaire located in the appendixes.

3.1 The Program Description

3.2 What Are Our Computer Integrated Instruction (CII) Goals?

3.3 What CII Skills and Knowledge Does Our Staff Have?

3.4 What Is Our Plan?

3.5 Have the Activities Been Implemented as Planned?
What Progress Has Been Made toward Meeting Goals?

3.6 What Are the Strengths and Weaknesses of Our CII Program?

Organization of Sections 3.1 - 3.6

In the following pages, the title of each section states the evaluation topic or question. After the heading "Uses" is the name of the questionnaire and its page number in the appendixes. Next, after the heading "Depends on" is an explanation of what other questionnaires, if any, will provide helpful information to describe the program or answer the question. For instance, in Section 3.2, the Goal Questionnaire "depends on" the Program Description. Following the "Results" heading is an explanation of the form of the information derived from the questionnaire.

The Introduction to each section gives background information related to the evaluation topic or question. Relevant issues are discussed and potential problems are raised, along with possible solutions. The section entitled "Expanded Directions" elaborates on the short directions included with the questionnaire in the appendixes.

Section 3.1
The Program Description

Uses: Program Description Questionnaire, page 37

Depends on: May depend on Staff Questionnaire (See section "Instructional Delivery," page 10)

Results: Profile of school CII program, including equipment, facilities, and computer use by grade

Introduction

The Program Description provides background information for the evaluation and helps in completing other questionnaires, particularly the goals questionnaire.

As you complete the questionnaire, you may find some sensitive areas, especially when dealing with personnel. An accurate description of a program is important because program improvement depends on knowledge of the program being improved. Program evaluation, however, requires diplomacy in dealing with sensitive issues. Offending people without cause can make it difficult to get information for the evaluation and to get people to carry out the recommendations of the evaluation.

You can encourage support of the evaluation effort by promoting good communication and involvement of others. By being approachable and by being involved with and supportive of others, you can lay the groundwork for positive communication. Then you can explain the evaluation procedures and point out that you are evaluating the program, not personnel.

You will find it helpful to get others involved for several reasons. First, spreading the workload makes it easier for you. Second, people are more likely to support what they are a part of. Finally, it will encourage the implementation of the recommendations contained in the evaluation.

Expanded Directions

In developing a program description, consider the following sections and choose sections relevant to your needs.

Context

The context explores background information for the evaluation. Answer the following questions and consider the relevant issues as they relate to your CII program.

Description of the school. How is your school unique in the district or community? How would you describe student learning? Does this have implications for student computer use?

Description of the community. How strongly does your community support education? What implications does this have for computer use at your school?

Description of the district. In general, how supportive has the district been in the instructional use of computers? What knowledge about your district would be helpful in relation to the use of CII?

Financial outlook. Purchasing new computers and providing computer inservice training can be expensive. The financial outlook of your school district can help you gauge the scope of recommendations for your CII program.

Problems and opportunities. Some problems make evaluation more difficult and/or hinder the attainment of school computer goals. An example is antagonism between the administration and teachers. Other problems are really opportunities for the CII program to solve a problem. For instance, if students are poor writers, word processing may help them become better writers.

Distinctive Computer Use

What distinctive computer projects are in place? Do you have computer projects that are funded by grants or that are otherwise special?

Administration

Who is in charge of the various phases of the computer education program in your school? Delineate the roles for the principal, computer coordinator or specialist, media specialist, key teachers, and others.

Instructional Delivery

If your school serves more than six grade levels, you will need to make a blank copy of the "Computer Use by Grade" portion of the questionnaire. The data can be compiled in two ways. If only a few teachers are using CII, ask them what CII applications they are using and enter the information directly. Otherwise, you can ask teachers to complete the staff questionnaire and get the information from the individual questionnaires.

The abbreviation codes help with entering data quickly. For entries other than those coded, you can make up your own abbreviations.

Hardware Inventory

Inventory the hardware in your school available for instructional use. This part of the questionnaire is divided into sections for listing computers, printers, and other hardware, such as modems or graphics pads.

When giving the name of the computer, include the model, for example, Apple IIGS. For specifying memory, use the number of K, such as 128 K. Then, enter the number of disk drives and the size of disk used (5 1/4" or 3 1/2"); specify the existence of a hard disk or network. Next, enter the number of computers connected to a printer—by direct connection, switch, or network. Finally, specify the location. If the computers are distributed in classrooms, specify the number per grade level.

Follow similar procedures for inventorying printers and other hardware. When specifying printers, some of the possible types are dot matrix (possibly color), daisy wheel, and laser.

Goals

State, district, and/or building goals provide the direction and focus for the CII program. Attach a copy of any of your written goals to the Program Description. If you need new or revised building goals, you can later use the goals questionnaire to provide a list of goals in priority order. The background information in this report can assist in writing goals. For instance, the financial outlook section can help you decide whether or not to choose goals that are expensive to implement.

Section 3.2
What Are Our CII Goals?

Uses: Goal Questionnaire, page 45

Depends on: Program Description

Results: Goals listed in order of priority

Introduction

Goals provide direction for the CII program at various stages of development. In the beginning, they aid in planning activities to meet the goals. Later, the goals can be compared with program activities to see which planned activities were implemented and to what degree goals were met.

A goal is a statement of "who" will do "what" "when." One example of "who" is fifth- grade students. The "what" is something the program will attempt to achieve, for example, "type a one-page paper using word processing." The "when" section tells when the goal should be accomplished. The complete goal is: "By 1992, all fifth graders will type a one-page paper using word processing."

As you write your goals, be aware of several issues. The first is whether you are going to specify an activity or a performance level. An activity goal is easier to achieve because it specifies only that an activity takes place. The goal "By 1992, all fifth graders will receive training in word processing" specifies that the activity of receiving training in word processing should take place but does not specify a performance level. The goal "By 1992, all fifth graders will type a one-page paper using word processing" assumes that the activity of word processing has occurred and goes on to specify the performance level of typing a one-page paper.

Related to the issue of activity versus performance is the issue of how to verify goal attainment. It is easier to verify attainment of an activity goal than of a performance goal. For the goal "By 1992, all fifth graders will receive training in word processing," the evidence could be a statement by the teacher that a word-processing unit was taught. To prove that the goal "By 1992, all fifth graders will type a one-page paper using word processing" has been met could require collecting a paper from each student. This is still easier, however, than trying to prove that the goal "By 1992, all fifth graders will be proficient at word processing" has been met.

The next issue is the appropriate grade level for applying goals. The maturity of students at various ages will affect the types of skills they can learn. For some goals, the sequence is important. For instance, keyboarding should be taught before word processing, not after.

Three issues in considering goals concern how to choose good goals. First is the relationship of computer and district goals. Many districts do not have goals that address word processing, but they do have goals relating to the writing ability of students. The goal "By 1992, all fifth graders will type a one-page paper using word processing" supports the district's goal of improving student writing ability.

The second issue relates to feasibility. Your own goals that support district goals may not always be achievable. One possible barrier is a lack of resources

for purchasing equipment or training teachers. Other barriers include a lack of support on the part of the administration or teachers.

A third area of concern in considering goals is whether a goal promotes an efficient use of money and time. The purpose of CII is to help students work more productively, but is the increased productivity worth the cost of buying equipment and training teachers?

Figure 3.2-1 lists some CII goals and factors influencing the selection of goals. The goals state what will be achieved but not who will achieve them or when they will be achieved. The next column lists traditional goals supported by the CII goals. Then the grade levels to which the goals apply are given. These are general guidelines that may or may not apply to your students.

The next column suggests the times needed to achieve the various goals: the number of weeks of instruction and the amount of computer time per student per week. The estimate of computer time per student gives an idea of the computer arrangement needed, such as a classroom with one computer or a lab with fifteen computers. If the amount of time needed per student is 30 minutes or less per week, a classroom with one computer is adequate. If 30 - 60 minutes per week are needed, then a setting with two or more computers is advisable. When more than one hour of computer time per week is needed, then a lab setting is advised. Of course, a lab setting is adequate, but not necessary, for all activities.

The last column in the chart estimates the number of hours of training needed for a teacher to master the software used in support of each goal. It is assumed that the teacher already can use the computer to load and use simple programs. The figures represent the number of hours needed for individual instruction at the computer plus some time for practice in order to feel comfortable using the software. For group instruction, the number of hours is greater. While the time can vary among individuals, the estimates show the relative effort needed to learn to use the software. This gives an idea of the resources needed to provide training.

Using CII involves three levels of teacher learning. The first level is learning to use the software. This is represented by the time estimates in the chart. At the second level, the teacher learns to teach students to use the software. At the third level, new noncomputer methods are learned for teaching the underlying subject. For instance, using word processing in a writing class can affect the way writing is taught.

As you examine or choose your building goals, keep in mind that these goals do not exist in a vacuum. Your goals should be compatible with district and state goals, if they exist, and compatible with one another.

You may have problems writing goals. If you feel that you need more help than this guide offers, consider other resources, such as another person or group of people who have the knowledge you need. You may be able to find them within your own school district. Other good resources are books[1] and magazines in the computer education field. Attending computers in education conferences, workshops, and classes can provide further assistance.

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[1]For example, Moursund, David & Ricketts, Dick. *Long-Range Planning For Computers in Schools.* Eugene, OR: Information Age Education, 1988.

Figure 3.2.1
Goal Chart

Goal	Traditional Goal Supported	Grade to Teach	Time Needed		Training Time for Teachers
			# of Weeks	per Week	
Create a picture using graphics software	Developing artistic expression	K-6	2	30 min. or less	1 hour
Keyboard at the speed of handwriting	Improving writing	4-6	6-8	2 hours	3 hours *
Type, edit, and print a paper using word processing	Improving writing	4-6	648	30-60 min.	5 hours
Manipulate information using a database	Practice problem-solving strategies	5-6	4-6	30 min. or less	5 hours
Produce a graph using graphing software	Drawing a graph	3-6	4	30 min. or less	5 hours
Practice problem solving strategies using simulations and problem-solving software	Practice problem solving strategies	K-6	2-4	30 min. or less	1 hour

* Assumes touch typing ability of the person being trained.

Writing goals that all people in your building can agree upon or accept may be another problem. A possible solution is to give teachers a choice of goals that they can pursue.

Expanded Directions

Duplicate enough blank copies of the questionnaire for your CII goals. Then attach a copy of applicable state and district CII goals. To write goals, you may find it helpful to express them in the form: By (date), (someone) will (do something). For each goal, rate its priority. A high priority goal is most important. A low priority goal is less important. Then describe the evidence of goal attainment.

The next section on the questionnaire asks if you have the resources to achieve the goal. First, check the adequacy of hardware, for example, a computer and printer. Next, mark the adequacy of software. Do you have enough legal copies of software for the computers involved? Finally, determine whether the teacher or teachers who will provide instruction in the activities have adequate training.

The last section is for comments about any answers that need further explanation or for comments not covered by the ratings.

Section 3.3
What CII Skills and Knowledge Does Our Staff Have?

Uses: Staff Questionnaire, page 49

Depends on: Plan Questionnaire

Results: Profile of computer skills, list of training needs

Introduction

The staff, including teachers and aides, is the key resource in developing a CII program. First, the staff works with the students while they use the computers. Second, staff members teach the skills that the computers reinforce. For instance, the use of word processing aids students in their writing, but it is the teacher who provides the actual writing instruction. Third, and most importantly, it is staff who decides when to use the computer for instruction and when to use traditional methods.

Even though this guide was written to evaluate CII, a profile of staff computer knowledge and skills should acknowledge other instructional uses of computers, such as CAI and programming. Then the CII program can become stronger by building upon those other skills.

Typically, teachers go through three stages in developing computer skills. In the first stage, they use the computer themselves. For example, they use the word processing capabilities to type materials and worksheet generator programs to produce worksheets and puzzles. Perhaps they also use a gradebook program. In stage two, they use the computer for instructional purposes but as an add-on to the existing program. Students use the computer as a reward for doing their work or for remediation and enrichment. In stage three, teachers find ways to integrate computer instruction with existing instruction, as in CII.

Expanded Directions

You can get the information asked for in the Staff Questionnaire in two ways. If only a few of the staff use CII, you can interview them and complete the questionnaire for them. Then you can explain unfamiliar terms and skip items that do not apply. Otherwise they can complete the questionnaire themselves.

Not all the types of software and computer-related skills mentioned on the questionnaire may be familiar to a person completing it. The following explanations may be helpful.

Graphics software. Graphics software is of two types. The first type, such as "Print Shop," allows you to create a card, poster, or banner by using ready-made pictures and print fonts. The other type, such as "Dazzle Draw," is a drawing type of program. It provides lines and shapes that allow you to create your own pictures.

Problem solving software. In this type of software, such as "The Factory," the computer poses a problem. The student thinks about the problem and then proposes a solution. The computer informs the student of progress toward the goal and the student attempts another solution until the problem is solved.

Touch typing at least 20 words per minute. Typing can be done either on a typewriter or computer.

Word processing software. The important skills are entering text into the computer, correcting mistakes, and saving, retrieving, and printing the text.

Database software. A database organizes large amounts of information. It allows one to enter information into categories. Then the information can be sorted and printed. Items can be retrieved from the database by specifying the category.

Graphing software. Some of the graphs created are bar, pie, and line graphs.

Simulation such as "The Oregon Trail." The simulation recreates a process or event. Often the simulation takes the form of a game.

Use drill and practice software. One example is a program that drills on math facts.

Programming. This includes programming in the languages BASIC, Logo, etc.

Grade-keeping software. The software stores, calculates, and prints student grades.

Software to generate and print student worksheets. For example, worksheets of math problems, word searches, and crossword puzzles may be printed.

Section 3.4
What Is Our Plan?

Uses: Plan Questionnaire, page 55

Depends on: Program Description, Goals Questionnaire, Staff Questionnaire

Results: CII Plan with activities and needed resources

Introduction

The goals of the program show what is important to achieve. The plan outlines a strategy for achieving the goals. For each goal, it lists activities leading to meeting the goal and additional resources that will be required.

Expanded Directions

Make one copy of the blank questionnaire for each goal. Use the Goal Questionnaire to find the goal, targeted grades, and evidence that the goal has been achieved.

Then, write the activities that will be needed to teach the skills and knowledge necessary to achieve the goal. Be as specific as possible. Include the grade level where the activity will occur.

Next, enter the staff training needed to teach the activities. Use the completed Staff Questionnaire as a guide to present staff knowledge.

Next, enter the additional hardware needed. The existing hardware is listed in the Program Description.

Then list the additional software needed. The Goal Questionnaire should tell you if your present software is adequate for meeting the goal. Finally, specify the printed material necessary to meet the goal. In the case of both the software and the printed material, make certain that you have allowed for the cost of legal copies.

Section 3.5
Have the Activities Been Implemented as Planned? What Progress Has Been Made toward Meeting Goals?

Uses: Activity Implementation and Goal Attainment Questionnaire page 59

Depends on: Plan Questionnaire

Results: List of goals implemented, reasons goals not implemented, list of goals met, reasons goals not met, recommendations for improvement

Introduction

After the CII plan has been written and been in effect a while, the next step is to see if the activities specified in the goals were actually carried out. For instance, the goal may be for fourth graders to keyboard as fast as they can write. The first concern is to see if they actually received keyboarding instruction, and the next is to see to what extent the keyboarding goal was met.

The means for determining whether activities were implemented and goals were met is to compare the planned activities with the activities that actually took place. A list of planned activities can be found in the Plan Questionnaire.

The activities implemented and goals met will be tabulated on copies of the Activity Implementation and Goal Attainment Questionnaire. One copy of the questionnaire is needed for each goal. If the number of teachers involved in CII is small, one person could go to the other teachers and ask them for the needed information. If the number of teachers involved is large, several people could each get the information needed to compile one questionnaire.

Expanded Directions

Make one copy of the questionnaire for each CII goal. On each questionnaire, enter the goal, circle the applicable grades, and enter the evidence of attainment.

For each class affected by the goal, enter the code for the proportion of the class meeting the goal. If not measuring goal attainment, enter "na." Next, enter the code for the content area in which the skill was taught and who taught the skill. Finally, enter the code for further resources needed, if any.

Section 3.6
What Are the Strengths and Weaknesses of Our Program?

Uses: Strengths and Weaknesses Questionnaire, page 63

Depends on: None

Results: List of specific strengths and weaknesses

Introduction

Up to this point, the evaluation has focused on the planning of goals, the implementation of activities related to goals, and the measurement of the attainment of goals. Program evaluation can, however, take place in the absence of goals. General issues can be examined independent of specific goals.

One issue is the general attitude of those participating in or affected by the CII program. Do they support the program? Another issue is the management of the program. For instance, do teachers have access to computers when they need them? Another issue is whether students learn better when they can use computers. Yet another area is the question of what people consider to be strengths and weaknesses of the program.

Expanded Directions

Ideally, administrators, teachers, students, and the community should be consulted for their perceptions of the school CII program. Depending on time constraints, one or several people may complete this questionnaire. If only a few people are consulted, they should represent the opinions of missing groups. You will need one copy of the questionnaire for each person completing it.

CHAPTER 4
Analyzing the Data

The purpose of this chapter is to provide help in analyzing the data from individual questionnaires. Each of the following sections discusses one questionnaire. Within each section are three subsections. The 'Interpretation' subsection aids in interpreting the questionnaire. The 'Conclusions' subsection explains how to find the answer to the evaluation question. The 'Recommendations' subsection assists in preparing recommendations for present and future action.

Goal Questionnaire

Your planning and goal setting has produced a series of goals. The purpose of this analysis is to examine the appropriateness of the goals.

Interpretation

If one person has completed this questionnaire, skip to the 'Conflicts' section. If more than one person has completed the questionnaire, you will find it helpful to compile the list of goals. One way to do this is to cut the questionnaires in half so that there is one goal listed on each sheet. Then make three stacks with matching priority goals on each stack. Eliminate any duplicates.

Conflicts. Now you are ready to begin the interpretation. First look for conflicts among goals. School goals may conflict with district goals. The goals may also conflict with each other. For instance, your goal of having students use word processing extensively in the fifth grade may conflict with the goal of having students proficient in Logo programming in the fifth grade. To resolve the conflict, you may need to eliminate some goals or schedule them for different grades.

Resources. Next, check for goals that are of high priority but for which there are insufficient resources, in hardware, software, and/or teacher skills. To resolve the disparity, either the goal or the resources may have to change.

Increasing the level of funding would reduce the disparity, but often that is not possible. When this occurs, the options are to reduce the priority of the goal so that it will be pursued at a later time or attempt to use your present resources more effectively.

Conclusions

A prioritized list of goals is the conclusion for this section.

Recommendations

The recommendations may affect goals or the level of resources committed to CII. If you already have goals and the results of this analysis show that resources are not sufficient to support some of your present goals, or you now think the goal is less important, then you may recommend a change in goals at either the school or the district level.

You may recommend an increase in funds to purchase more hardware or software. The financial outlook section in the Program Description Questionnaire might give an indication if seeking more funds is practical.

Perhaps you will suggest a different use of present resources. If you have a computer lab, you may decide to distribute the computers to teachers' rooms. If all the computers are in teachers' rooms, you may decide to move the computers into one room to make a lab.

Staff Questionnaire

Interpretation

If more than one person completed the questionnaire, compile the individual responses using the Staff Compilation form. The information from questions 16-26, which ask about actual classroom computer use, can be transferred to the "Computer Use by Grade" form in the Program Description. This data will be compared with the activities in the "What Is Our Plan?" Questionnaire to determine the staff computer training needs.

Conclusions

From this questionnaire, specific areas of staff computer strengths and weaknesses can be identified.

Recommendations

Some general recommendations can be made for further staff training. More specific recommendations, however, may have to wait until the CII plan is written in order to see what computer skills are needed for the teachers in each grade level.

Plan Questionnaire

Interpretation

Now that the plan is complete, examine it. What you are looking for is a balance between importance of the goals and the practicality of providing the necessary resources. Does the plan list goals you feel are important? Do you think the plan will accomplish the goals?

Examine the plan to see if it is practical. If the plan is expensive, where is the money going to come from? If the plan requires extensive staff training, will the staff likely accept that?

Conclusions and Recommendations
After it has been completed and revised if necessary, the plan itself is the conclusion for this part of the evaluation. The requests for additional staff training, hardware, software, and printed materials become the recommendations.

Activity Implementation and Goal Attainment Questionnaire

Interpretation and Conclusions
Gather the questionnaires "Implementation and Attainment by Grade" and "What Is Our Plan?" For each goal, note the match between what was planned, what was implemented, and what was achieved. Where activities were not implemented and/or goals were not met, decide what resources are needed to achieve them.

Recommendations
Make recommendations for resolving the discrepancy between planned and actual activities. One possible solution is to provide better access to training, hardware, software, and printed materials. Another possible solution is to change the goal. Perhaps the goal is unrealistic, given your present circumstances or resources.

Strengths and Weaknesses Questionnaire

Interpretation
If more than one person completed the questionnaire, compile the individual responses using the Strengths and Weaknesses Compilation form.

Conclusions
The strengths of the program are the statements with the highest level of agreement, along with the positive comments. The weaknesses are the statements with the lowest level of agreement, along with the negative comments.

Recommendations
The suggestions for improvement form one set of recommendations. Another set of recommendations emerges as a result of negative ratings. For instance, if one program weakness is that teachers have poor access to computers, then a recommendation is to improve the access to computers if they are available.

CHAPTER 5
Reporting the Results

With the information collected and the conclusions drawn, all that is left is to report the findings of the evaluation. The evaluation report should answer some basic questions:

1. Why was the evaluation done?
2. How is the program functioning now?
3. What evaluation questions were asked?
4. What were the answers to the evaluation questions?
5. What recommendations should be made for future action?

Reasons for the Evaluation

In one paragraph, state the reasons for conducting the evaluation. Here are some possible reasons:

1. We routinely evaluate new programs.
2. The superintendent requested an evaluation.
3. The evaluation was part of a larger evaluation of all school programs.

Program Functioning

Summarize the parts of the Program Description pertinent to the evaluation. The purpose for conducting the evaluation will determine the level of detail and choice of points to emphasize. These are some points to consider:

1. Goals of the program (unless they will be discussed later in the report).
2. Computer use grade by grade.
3. Special computer projects or uses.

Evaluation Questions

List the particular questions that were chosen to be answered for the evaluation. The questions are:

1. What Are Our Computer Integrated Instruction (CII) Goals?
2. What CII Skills and Knowledge Does Our Staff Have?
3. What Is Our Plan?

4. Have the Activities Been Implemented as Planned?
   What Progress Has Been Made toward Meeting Goals?
5. What Are the Strengths and Weaknesses of Our CII Program?

Answers to Evaluation Questions

For each question, summarize the conclusions, depending on the level of detail required for the report. Add any general conclusions not already mentioned.

Recommendations

Summarize the recommendations from each evaluation question answered. The recommendations will be stronger if they follow logically from conclusions already mentioned. Consider the following conclusions:

- Only 10% of the teachers can use a database.
- Adequate computers and database software exist.
- The top priority goal is for students to use a database.

The recommendation that follows is that teacher training should be provided in the use of databases.

APPENDIX 0

Planning Questionnaire

Planning Questionnaire

Directions: For each questionnaire you will use, mark the initials of the person who will complete the questionnaire. If more than one person will complete a questionnaire, mark "C" for "composite." You will probably not use all questionnaires.

_____ 1. Program Description Questionnaire

_____ 2. Goal Questionnaire

_____ 3. Staff Questionnaire

_____ 4. Plan Questionnaire

_____ 5. Activity Implementation and Goal Attainment Questionnaire

_____ 6. Strengths and Weaknesses Questionnaire

Use the codes below to complete the time schedule for the evaluation. When entering the code for "Administer Questionnaire," enter "AQ" and then the number of the questionnaire, for instance "AQ3" for "Administer the Staff Questionnaire."

Week	Monday	Tuesday	Wednesday	Thursday	Friday
1					
2					
3					
4					

Key P=Planning
I=Interpreting Data
R=Reporting Results

AQ#=Administer Questionnaire # (#=1-6)
1=Program Description Questionnaire
2=Goal Questionnaire
3=Staff Questionnaire
4=Plan Questionnaire
5=Implementation, Attainment Questionnaire
6=Strengths and Weaknesses Questionnaire

APPENDIX 1
Program Description Questionnaire

Program Description Questionnaire

Context of the School

1. What makes your school distinctive in the community/district?

   _____
   _____
   _____

2. What is the average student achievement compared to surrounding schools?

   Below average ___ Average ___ Above average ___

3. What can you add about your school that might be helpful in a program evaluation of computer integrated instruction?

   _____
   _____
   _____

Community

4. How strongly does your community support education?

   _____
   _____
   _____

5. What implications does this have for computer integrated instruction at your school?

   _____
   _____
   _____

District

6. How supportive has the district been in the instructional use of computers in your school?

   Not supportive ___ Somewhat supportive ___ Very supportive ___

7. Describe this support or lack of it.

_____

_____

_____

8. What other information related to evaluation of CII can you provide?

_____

_____

_____

Financial Outlook

Considering the financial outlook of the district for the next several years, rate the district's willingness to make the following expenditures, based on the scale below:

1=not willing 2=maybe 3=willing

9. Maintain current computer hardware 1 2 3

10. Buy new software 1 2 3

11. Buy new computers 1 2 3

12. Pay for inservice training of staff 1 2 3

13. What type of general curriculum project is your district most willing to fund?

_____

_____

_____

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Problems and Opportunities

Rate your agreement or disagreement with statements about problems and opportunities in your school. Use the following scale:

1=disagreement 2=neutral 3=agreement

Problems that would hinder the evaluation

14. Faculty morale is low.	1 2 3
15. Relations with the district are strained.	1 2 3
16. There is no time to do an evaluation.	1 2 3

Problems that would hinder attainment of CII goals

17. There is too little time in the curriculum to use computers.	1 2 3
18. Preparing CII lessons is too time consuming.	1 2 3
19. Access to computers is too limited.	1 2 3
20. Access to appropriate software is too limited.	1 2 3
21. Teacher knowledge of computers is too limited.	1 2 3

Opportunities for the use of CII

CII use might help

22. To develop problem solving skills.	1 2 3
23. To aid in the development of writing skills.	1 2 3
24. To promote following directions.	1 2 3
25. To organize information through the use of databases.	1 2 3
26. To help draw graphs.	1 2 3

Other problems or opportunities

27. _____

Distinctive Computer Use

28. Describe any special computer projects at your school.

Administration

29. What are the names and responsibilities of key people involved in the CII program?

	Name	*Responsibility*
1.		
2.		
3.		
4.		

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Instructional Delivery

Computer Use by Grade

Grade	Rm #	Computer Use(s)	Content Area(s)	Taught by

Hardware Inventory

Number of Computers	Brand and Model	Memory	Disk Drives (number)	Number with Printer Access	Location (Class,lab, etc.)

Number of Printers	Brand	Model	Type	Location	

Hardware	Type	Brand	Model	Type	Location
Number of Other					

38

APPENDIX 2

Goal Questionnaire

Goal Questionnaire

Directions: Duplicate enough blank copies of this form for your CII goals. Then attach a copy of applicable state and district CII goals. If you find it helpful, express goals in the form: By (date), (someone) will (do something).

Goal:_____

_____

Priority: low ___ medium ___ high ___

How verified?_____

Hardware is adequate. Yes ___ No ___ Will obtain ___

Software is adequate. Yes ___ No ___ Will obtain ___

Teachers are adequately trained. Yes ___ No ___ Will train ___

Comments:_____

_____

_____

_____

Goal:_____

_____

Priority: low ___ medium ___ high ___

How verified?_____

Hardware is adequate. Yes ___ No ___ Will obtain ___

Software is adequate. Yes ___ No ___ Will obtain ___

Teachers are adequately trained. Yes ___ No ___ Will train ___

Comments:_____

_____

_____

_____

APPENDIX 3

Staff Questionnaire

Staff Compilation

Staff Questionnaire

1. Grade level or subject taught _____

2. Years as a computer user _____

3. Years using computer in the classroom _____

Please rate your ability to do computer-related tasks. Use the following rating scale:

4 = am proficient
3 = can get by
2 = can do a little
1 = haven't learned yet
NA = not applicable

	LEVEL
4. Create a picture or poster using graphics software	NA 1 2 3 4
5. Use problem-solving software, such as "The Factory" or "Gertrude's Puzzles"	NA 1 2 3 4
6. Touch type at least 20 words per minute	NA 1 2 3 4
7. Type, edit, and print a paper using a word processor	NA 1 2 3 4
8. Enter, sort, and print a list using a database	NA 1 2 3 4
9. Use graphing software to create a bar graph or other simple graph	NA 1 2 3 4
10. Use a simulation such as "The Oregon Trail"	NA 1 2 3 4
11. Use drill and practice software	NA 1 2 3 4
12. Do programming	NA 1 2 3 4
13. Use grade-keeping software	NA 1 2 3 4
14. Use software to generate and print student worksheets	NA 1 2 3 4

15. What further computer-related training would be most helpful to you?

_____

_____

Complete the table below by circling "yes" for each type of computer use by your students, whether you or someone else teaches its use, and "no" where your students do not use it. For each "yes" answer, identify the content area and who teaches the software. The codes at the bottom of the table may be helpful.

Computer Use	Whether taught		Content Area	Who Teaches
16. Graphics	yes	no		
17. Problem Solving	yes	no		
18. Keyboarding	yes	no		
19. Word Processing	yes	no		
20. Database	yes	no		
21. Graphing	yes	no		
22. Simulations	yes	no		
23. Drill & Practice	yes	no		
24. Programming	yes	no		
25.	yes	no		
26.	yes	no		

Key

RL=Reading & Language Arts MA=Math SS=Soc. Studies SC=Science AR=Art	SE=Self AT=Another Teacher OS=Other Student SP=Specialist VO=Volunteer

Staff Questionnaire Compilation

Directions: Use hash marks to indicate the number of responses from each category on the Staff Questionnaire.

	K	1-2	3-4	5-6	Other
1. Grade levels taught					

	Read. Lang.	Math Science	Soc. Stud.	Art Music	Other
Subjects taught					

	less than 1	1-2	more than 2
2. Years as a computer user			
3. Years using computer in the classroom			

	NA	Level Little (1,2)	Much (3,4)
4. Create a picture or poster using graphics software			
5. Use problem-solving software, such as "The Factory" or "Gertrude's Puzzles"			
6. Touch type at least 20 words per minute			
7. Type, edit, and print a paper using a word processor			
8. Enter, sort, and print a list using a database			
9. Use graphing software to create a bar graph or other simple graph			
10. Use a simulation such as "The Oregon Trail"			
11. Use drill and practice software			

	NA	Level Little (1,2)	Much (3,4)
12. Do programming			
13. Use grade-keeping software			
14. Use software to generate and print student worksheets			

15. What further computer-related training would be most helpful to you?

    Summarize responses on a separate sheet.

16-26. Use page 37 of the Program Description Questionnaire for summarizing the "Computer Use" table.

APPENDIX 4

Plan Questionnaire

Plan Questionnaire

Goal: _____

_____

Targeted Grades: K 1 2 3 4 5 6

Evidence of Attainment: _____

_____

Activities to Support the Goal	Grade Level

Further Staff Training Needed to Meet This Goal: _____

_____

Additional Computer and/or Other Hardware Needed to Meet This Goal: _____

_____

_____

Additional Software Needed to Meet This Goal: _____

_____

Additional Printed Material Needed to Meet This Goal: _____

_____

APPENDIX 5

Activity Implementation and Goal Attainment Questionnaire

Activity Implememntation and Goal Attainment Questionnaire

Goal: _____

Targeted Grades: K 1 2 3 4 5 6

Evidence of Attianment: _____

Grade	Rm#	Skill Taught			Goal Met (What % of Class)	Content Area	Taught by	Further Resources Needed
		yes	no	na				
		yes	no	na				
		yes	no	na				
		yes	no	na				
		yes	no	na				
		yes	no	na				
		yes	no	na				
		yes	no	na				
		yes	no	na				
		yes	no	na				

Key

RL= Reading & Language Arts MA=Math SS=Social Studies SC=Science Ar=Art	TE=Teacher OT=Other Teacher OS=Other Student SP=Specialist VO=Volunteer	TR=Training HE=help HW=Hardware SW=Software PM=Printed Materials NO=None

APPENDIX 6

Strengths and Weaknesses Questionnaire
Strengths and Weaknesses Compilation

Strengths and Weaknesses Questionnaire

Please rate your level of agreement or disagreement with statements given. Use the following rating scale:

4 = complete agreement
3 = slight agreement
2 = slight disagreement
1 = complete disagreement
0 = don't know

1. Administrators are generally supportive of the CII program. 0 1 2 3 4
2. Teachers are generally supportive of the CII program. 0 1 2 3 4
3. Students are generally supportive of the CII program. 0 1 2 3 4
4. The community is generally supportive of the CII program. 0 1 2 3 4
5. Teachers have easy access to computers. 0 1 2 3 4
6. Teachers have easy access to software. 0 1 2 3 4
7. Teachers have easy access to computer-related printed material. 0 1 2 3 4
8. School personnel use only legal copies of software. 0 1 2 3 4
9. School personnel use only legal copies of printed material. 0 1 2 3 4
10. No groups are excluded from use of the computers. 0 1 2 3 4
11. Students are learning things using computers that they could not learn without them. Explain: 0 1 2 3 4

    _____

    _____

12. What are the strengths of the CII program? _____

    _____

    _____

13. What are the weaknesses of the CII program? _____

    _____

    _____

14. What are your other perceptions of the CII program? _____

_____

_____

15. What are your suggestions for improving the program? _____

_____

_____

Strengths and Weaknesses Compilation

Directions: Use hash marks to indicate the number of responses from each category of the Strengths and Weaknesses Questionnaire

	Level of Agreement		
	NA	Little (1,2)	Much (3,4)
1. Administrators are generally supportive of the CII program.			
2. Teachers are generally supportive of the CII program.			
3. Students are generally supportive of the CII program.			
4. The community is generally supportive of the CII program.			
5. Teachers have easy access to computers.			
6. Teachers have easy access to software.			
7. Teachers have easy access to computer-related printed material.			
8. School personnel use only legal copies of software.			
9. School personnel use only legal copies of printed material.			
10. No groups are excluded from use of the computers.			
11. Students are learning things using computers that they could not learn without them.			

Summarize explanations on another sheet.

12-15. Summarize comments on another sheet.

APPENDIX 7

Research Notes

Research Notes

Procedures

This guide, which is based on research done for the author's Ph.D. dissertation, was written to enable educators to gather and interpret information on computer integrated instruction (CII) programs at the elementary school level, and to make recommendations for program improvement based on that information. It was produced using a research and development design consisting of five steps: 1) study the literature, 2) write an initial version, 3) review and revise the initial version, 4) field-test the revised version, and 5) make recommendations for a final version (Borg & Gall, 1983; Billings, 1986).

The author wrote the handbook and submitted it to a panel of experts for review. This panel included experts in computers in education, as well as experts in program evaluation. The experts responded to a questionnaire and commented directly on the handbook to give helpful feedback and suggestions for improvement.

On the basis of the review process, the handbook was revised and then sent to schools for field-testing. Users reviewed the handbook, completed a field-test questionnaire, and filled out a time log of evaluation activities. Then they actually used the handbook to review their school or classroom CII programs.

As reviewers and field-testers completed their respective questionnaires, they responded to the research questions posed for the review process. The research questions were:

1. How easy is the handbook to use?

2. How long does the evaluation take?

3. How should the handbook be revised?

4. To what extent does the handbook assist the computer educator in gathering information and reporting the results of the school's CII program?

5. To what extent do the schools that use the evaluation handbook have an accurate description of their CII programs?

6. To what extent do schools that use the handbook have a secure basis for making decisions for revising their CII programs?

Conclusions

The following conclusions were found (Mowe, 1989):

1. The handbook is very easy to use.

2. The evaluation and handbook review process took a mean time of 7.63 hours. This time should be viewed as a minimum time.

3. The handbook should be revised to aid in summarizing questionnaire data and to provide customized questionnaires for districts. (This version of the guide reflects these suggested changes.)

4. The handbook assists in gathering information and reporting the results of the school's CII program. It is more helpful for gathering information than reporting results.

5. Handbook users felt that the handbook helped them gain an accurate description of their CII program and a secure basis for revising the program.

Recommendations

On the basis of the conclusions, the recommendations were:

1. Revise the handbook.

2. Conduct one more field test.

Revision

The following areas for revisions were suggested:

1. Provide compilation forms for the analysis of data and reporting of results.

2. Include sample forms and directions for modifying them.

Compilation of data. Handbook users completed questionnaires as part of the evaluation of their CII programs. But once they had completed the questionnaires, they needed a way to summarize data and report results from questionnaires. The handbook gives instructions for the compilation, but more is needed. As a result of the field test, the handbook has been revised to include compilation forms for the Staff Questionnaire and Strengths and Weaknesses Questionnaire.

Modification of forms. One of the comments made was that the handbook needs to present sample forms and provide advice for modifying those forms for the unique needs of schools. One way to do this would be to publish the handbook on disk as an AppleWorks or Works word processing file.

Field Test

An additional field test would have two emphases. First would be more accurate time estimates for the parts of the evaluation process. Second would be an examination of the assistance rendered by the handbook in reporting the results of an evaluation.

The time of the field test should be lengthened from 3 to 6 weeks. Fieldtest personnel should be reminded to submit a time log and a written evaluation.

References

Billings, K.J. (1986). *The development of an evaluation handbook for a computer education program.* Unpublished doctoral dissertation, Columbia University.

Borg, W.R., & Gall, M.D. (1983). *Educational research: An introduction (4th ed.).* New York: Longman.

Mowe, R. (1989). *The development of an evaluation handbook for computer integrated instruction.* Unpublished doctoral dissertation, University of Oregon, Eugene.

ef-fec-tive\i-'fek-tiv\adj (14c)

1 a : producing a decided, decisive, or desired effect b : IMPRESSIVE, STRIKING
2 : ready for service or action

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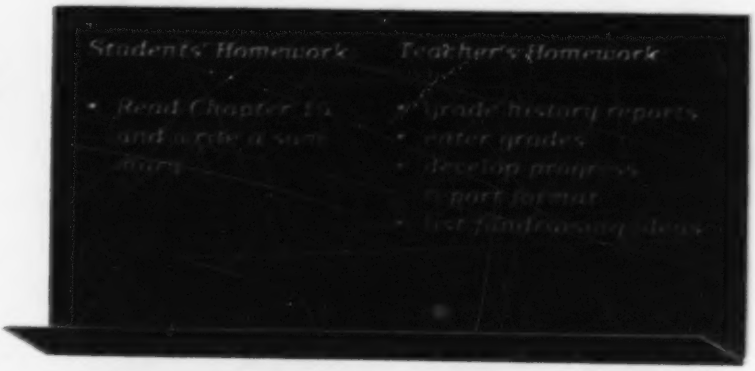

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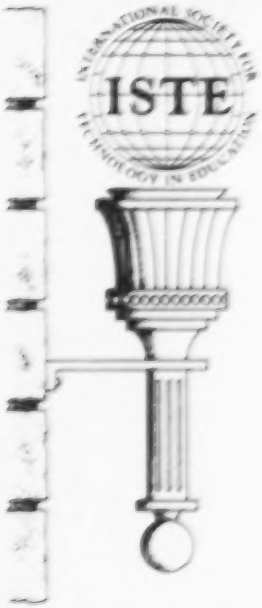

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